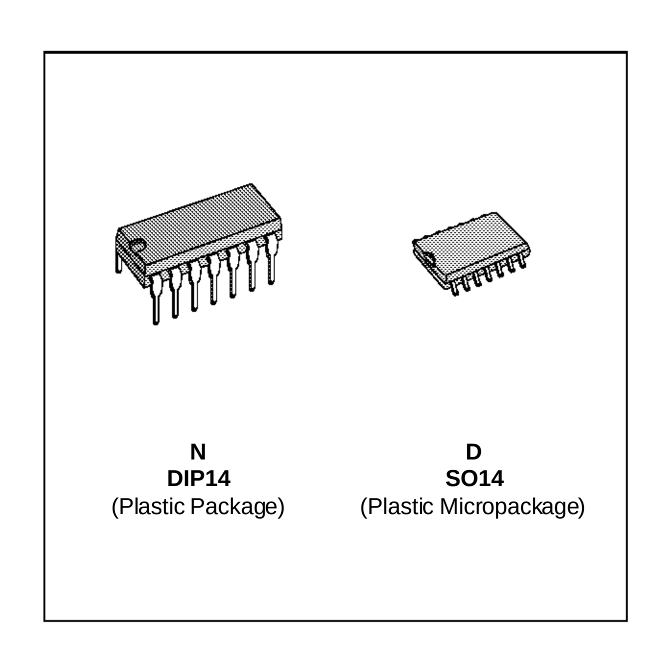



# LM119 - LM219 LM319

## HIGH SPEED DUAL COMPARATORS

- TWO INDEPENDENT COMPARATORS
- OPERATES FROM A SINGLE +5V SUPPLY
- TYPICALLY 80ns RESPONSE TIME AT ±15V
- MINIMUM FAN-OUT OF 2 EACH SIDE
- MAXIMUM INPUT CURRENT OF 1µA OVER OPERATING TEMPERATURE RANGE
- INPUTS AND OUTPUTS CAN BE ISOLATED FROM SYSTEM GROUND
- HIGH COMMON-MODE SLEW RATE




### DESCRIPTION

These products are precision high speed dual comparators designed to operate over a wide range of supply voltages down to a single 5V logic supply and ground and have low input currents and high gains.

The open collector of the output stage makes compatible with TTL as well as capable of driving lamps and relays at currents up to 25mA.

Although designed primarily for applications requiring operation from digital logic supplies, are fully specified for power supplies up to ±15V.

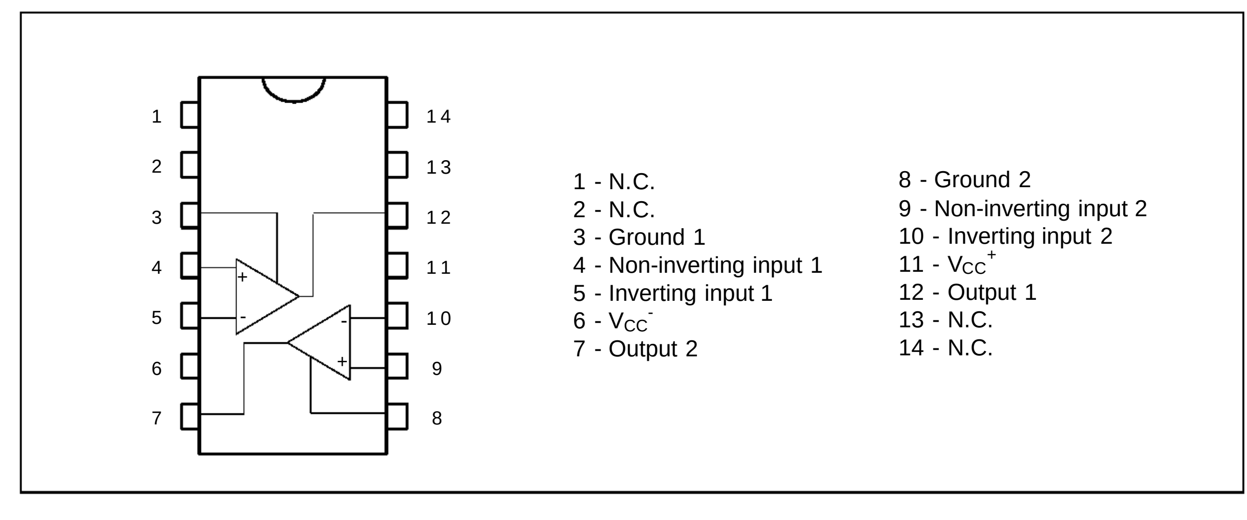
They feature faster response than the LM111 at the expense of higher power dissipation. However, the high speed, wide operating voltage range and low package count make the much more versatile.

### ORDER CODES

| Part Number | Temperature Range | Package N | Package D |
|---|---|---|---|
| LM119 | –55, +125°C | • | • |
| LM219 | –40, +105°C | • | • |
| LM319 | 0, +70°C | • | • |
| **Example :** LM219N | | | |

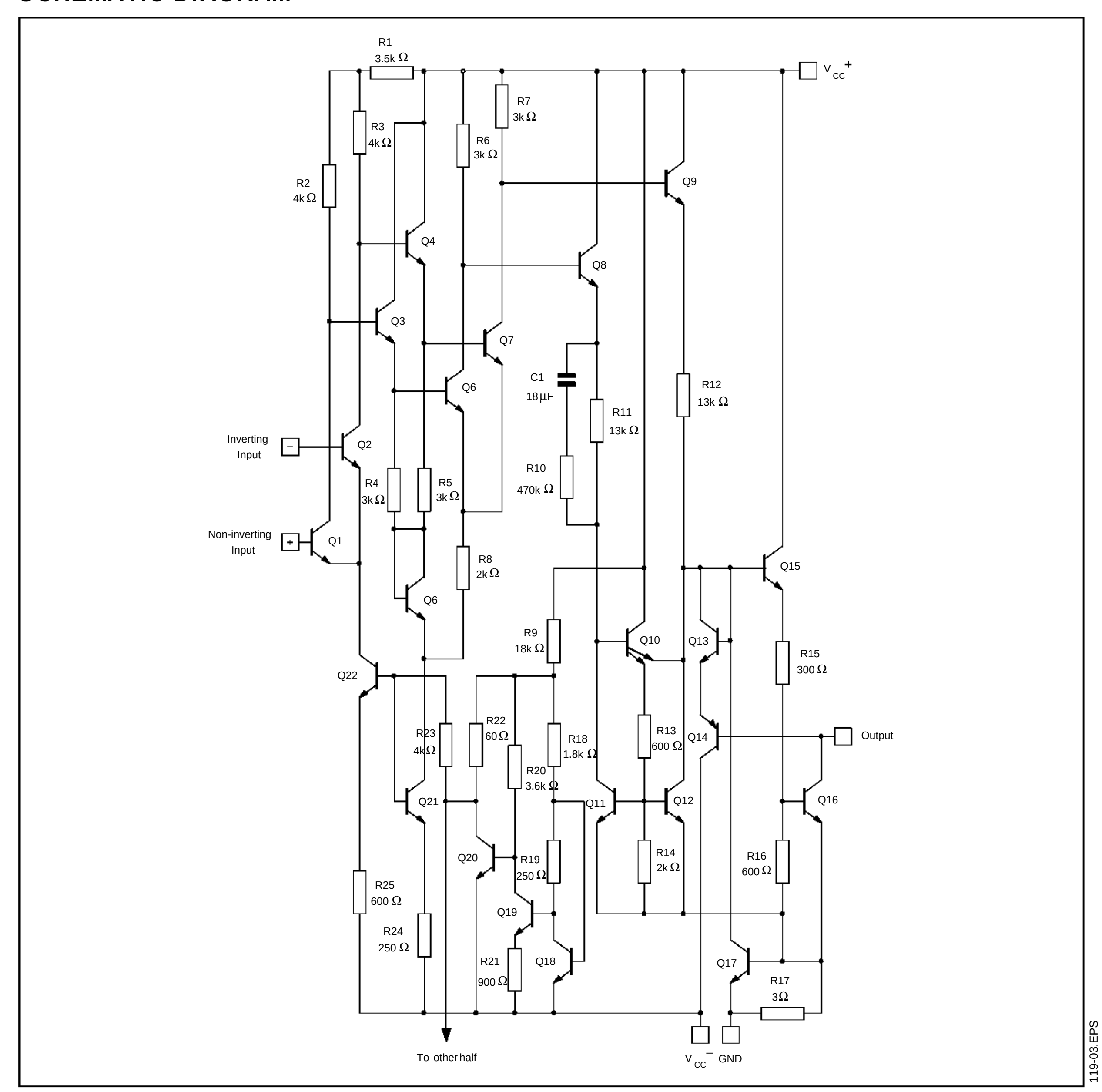
119-01.TBL

### PIN CONNECTIONS (top view)




1 - N.C.
2 - N.C.
3 - Ground 1
4 - Non-inverting input 1
5 - Inverting input 1
6 - $V_{CC}^-$
7 - Output 2
8 - Ground 2
9 - Non-inverting input 2
10 - Inverting input 2
11 - $V_{CC}^+$
12 - Output 1
13 - N.C.
14 - N.C.

## SCHEMATIC DIAGRAM




## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | LM119 | LM219 | LM319 | Unit |
|---|---|---|---|---|---|
| $V_O - V_{CC}^-$ | Output to Negative Supply Voltage | 36 | 36 | 36 | V |
| $V_{CC}^-$ | Negative Supply Voltage | 25 | 25 | 25 | V |
| $V_{CC}^+$ | Positive Supply Voltage | 18 | 18 | 18 | V |
| $V_{id}$ | Differential Input Voltage | ±5 | ±5 | ±5 | V |
| $V_i$ | Input Voltage – (note 1) | ±15 | ±15 | ±15 | V |
| $P_{tot}$ | Power Dissipation | 500 | 500 | 500 | mW |
| $T_{oper}$ | Operating Free-air Temperature Range | –55 to +125 | –40 to +105 | 0 to +70 | °C |
| $T_{stg}$ | Storage Temperature Range | –65 to +150 | –65 to +150 | –65 to +150 | °C |

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## ELECTRICAL CHARACTERISTICS

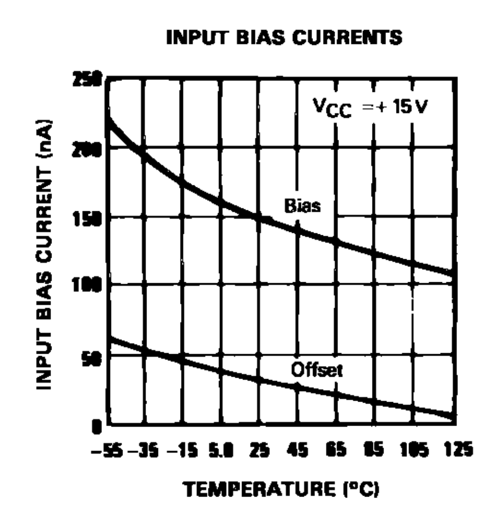
$V_{CC} = \pm 15V$, $T_{amb} = 25^oC$(unless otherwise specified)

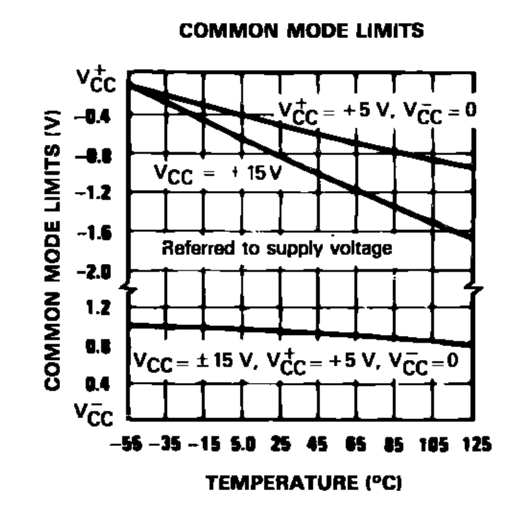
| Symbol | Parameter | LM119 - LM219 | | | LM319 | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| $V_{io}$ | Input Offset Voltage ($R_S \leq 5k\Omega$) – (note 2)<br>$T_{amb} = +25^oC$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$ | | <br>0.7<br> | <br>4<br>7 | | <br>2<br> | <br>8<br>10 | mV |
| $I_{io}$ | Input Offset Current – (note 2)<br>$T_{amb} = +25^oC$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$ | | <br>30<br> | <br>75<br>100 | | <br>80<br> | <br>200<br>300 | nA |
| $I_{ib}$ | Input Bias Current – (note 2)<br>$T_{amb} = +25^oC$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$ | | <br>150<br> | <br>500<br>1000 | | <br>250<br> | <br>1000<br>1200 | nA |
| $A_{vd}$ | Large Signal Voltage Gain | 10 | 40 | | 8 | 40 | | V/mV |
| $I_{CC}^+$ | Positive Supply Current<br>$V_{CC} = \pm 15V$<br>$V_{CC}^+ = +5V$, $V_{CC}^- = 0V$ | | <br>8<br>4.3 | <br>11.5<br> | | <br>8<br>4.3 | <br>12.5<br> | mA |
| $I_{CC}^-$ | Negative Supply Current | | 3 | 4.5 | | 3 | 5 | mA |
| $V_{icm}$ | Input Common Mode Voltage Range<br>$V_{CC} = \pm 15V$<br>$V_{CC}^+ = +5V$, $V_{CC}^- = 0V$ | <br>±12<br>1 | <br>±13<br> | <br><br>3 | <br>±12<br>1 | <br>±13<br> | <br><br>3 | V |
| $V_{id}$ | Differential Input Voltage | | | ±5 | | | ±5 | V |
| $V_{OL}$ | Low Level Output Voltage<br>$T_{amb} = +25^oC$, $I_O = 25mA$<br>$V_i \leq -5mV$<br>$V_i \leq -10mV$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>$V_{CC}^+ \geq +4.5V$, $V_{CC}^- = 0V$, $I_{O(sink)} < 3.2mA$<br>$V_i \leq -6mV$<br>$V_i \leq -10mV$ | | <br><br>0.75<br><br><br><br>0.23<br> | <br><br>1.5<br><br><br><br>0.4<br> | | <br><br><br>0.75<br><br><br><br>0.3 | <br><br><br>1.5<br><br><br><br>0.4 | V |
| $I_{OH}$ | High Level Output Current ($V_O = +35V$)<br>$T_{amb} = +25^oC$ $V_i \geq 5mV$<br>$V_i \geq 10mV$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$ $V_i \geq 5mV$ | | <br>0.2<br><br>1 | <br>2<br><br>10 | | <br><br>0.2<br> | <br><br>10<br> | µA |
| $t_{re}$ | Response Time – (note 3) | | 80 | | | 80 | | ns |

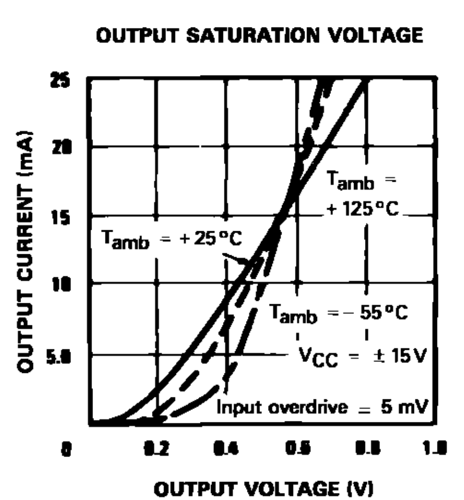
119-03.TBL

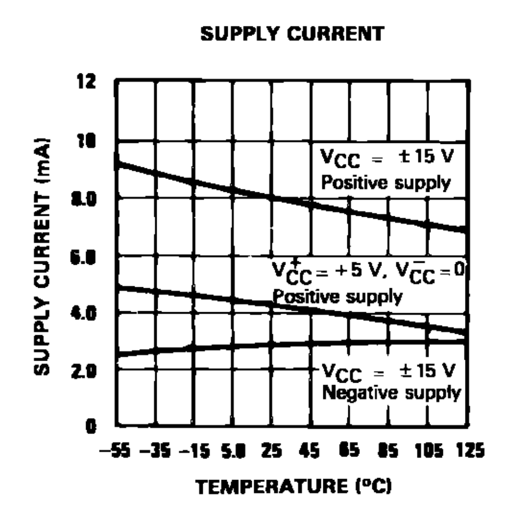
**Notes :**
1. For supply voltages less than ±15V the absolute maximum input voltage is equal to the supply voltage.
2. These specifications apply for $V_{CC} = \pm 15V$, unless otherwise stated. The offset voltage, offset current and bias current specifications apply for any supply voltage from a single +5V supply up to ±15V supplies. The offset voltages and offset current given are the maximum values required to drive the output down to 1V or up to +14V with a 1mA load current. Thus, these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.
3. The response time specified is for a 100mV input step with 5mV overdrive.

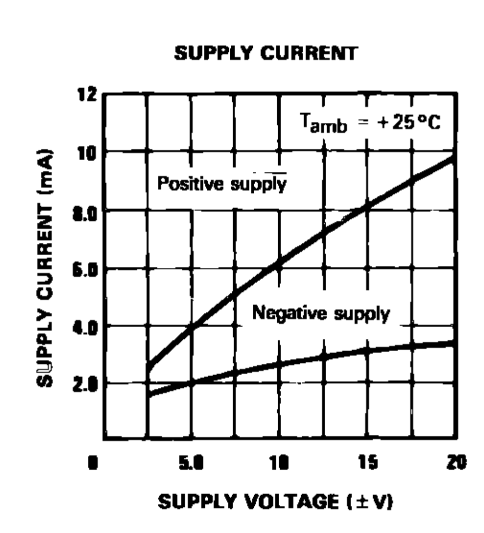
**LM119-LM219**

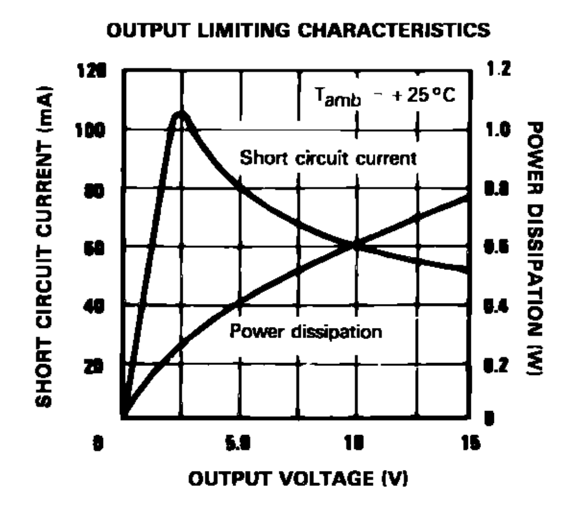


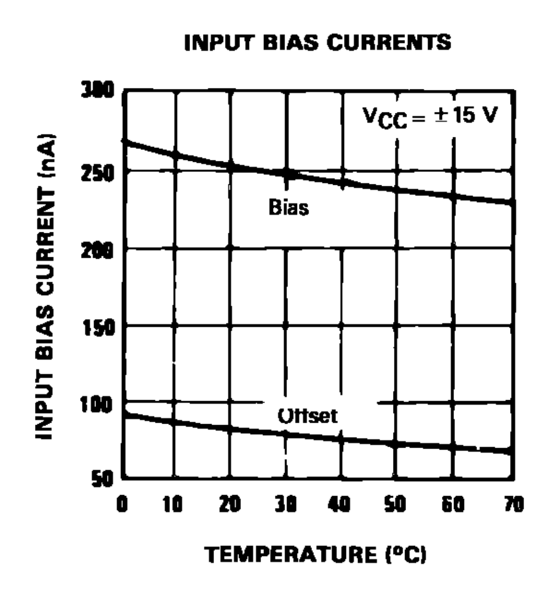



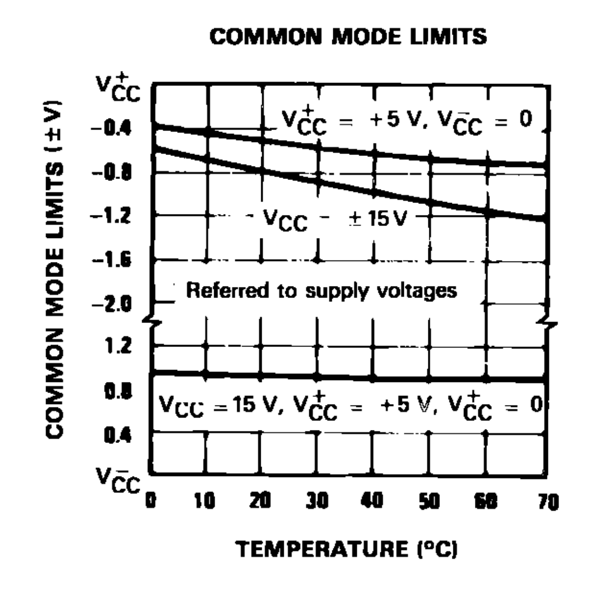



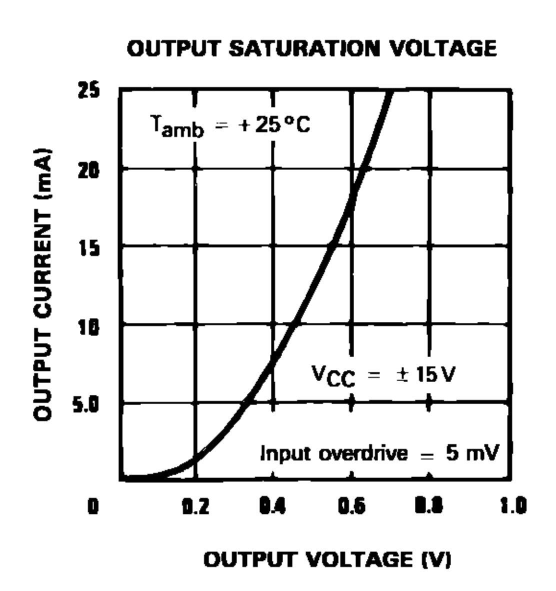



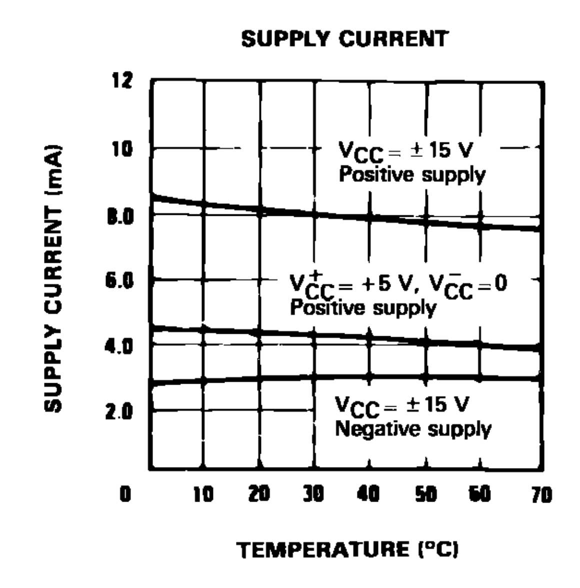

119-04.EPS

**LM319**



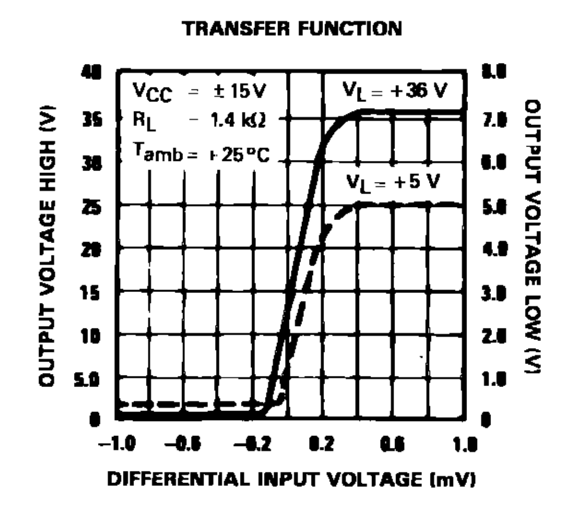



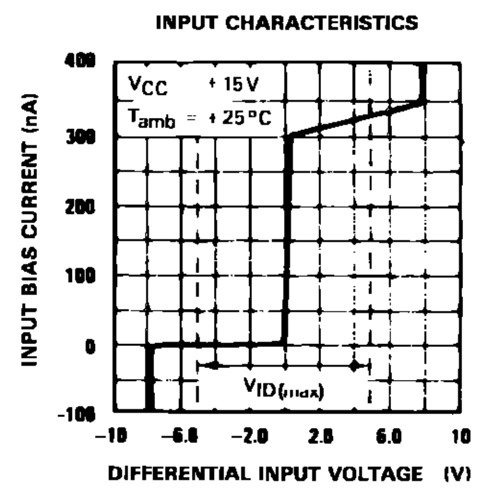




119-05.EPS

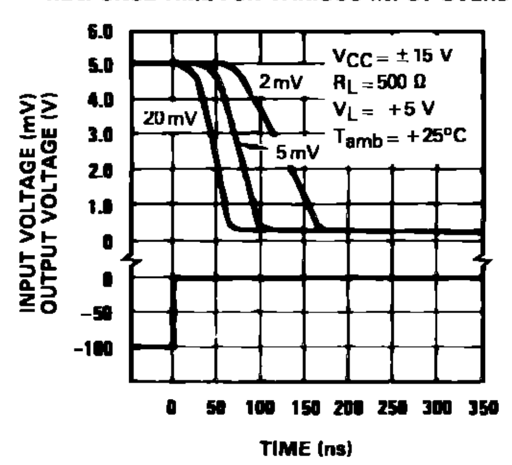
TRANSFER FUNCTION



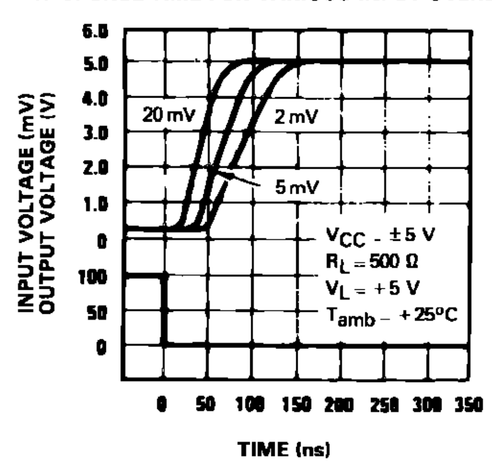

INPUT CHARACTERISTICS



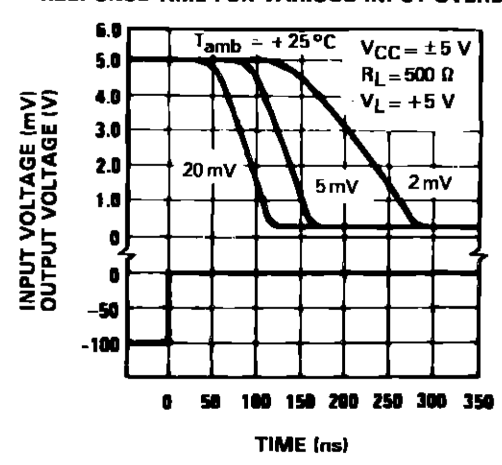

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



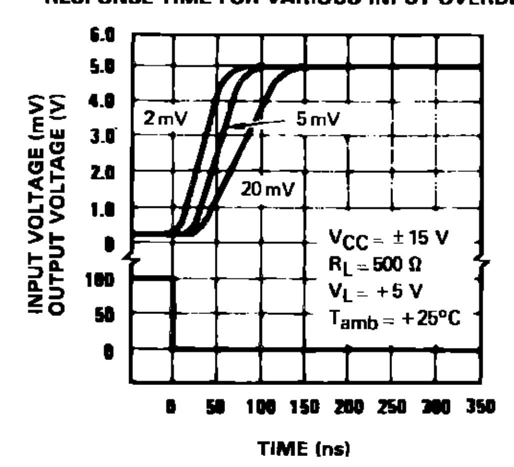

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES




RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



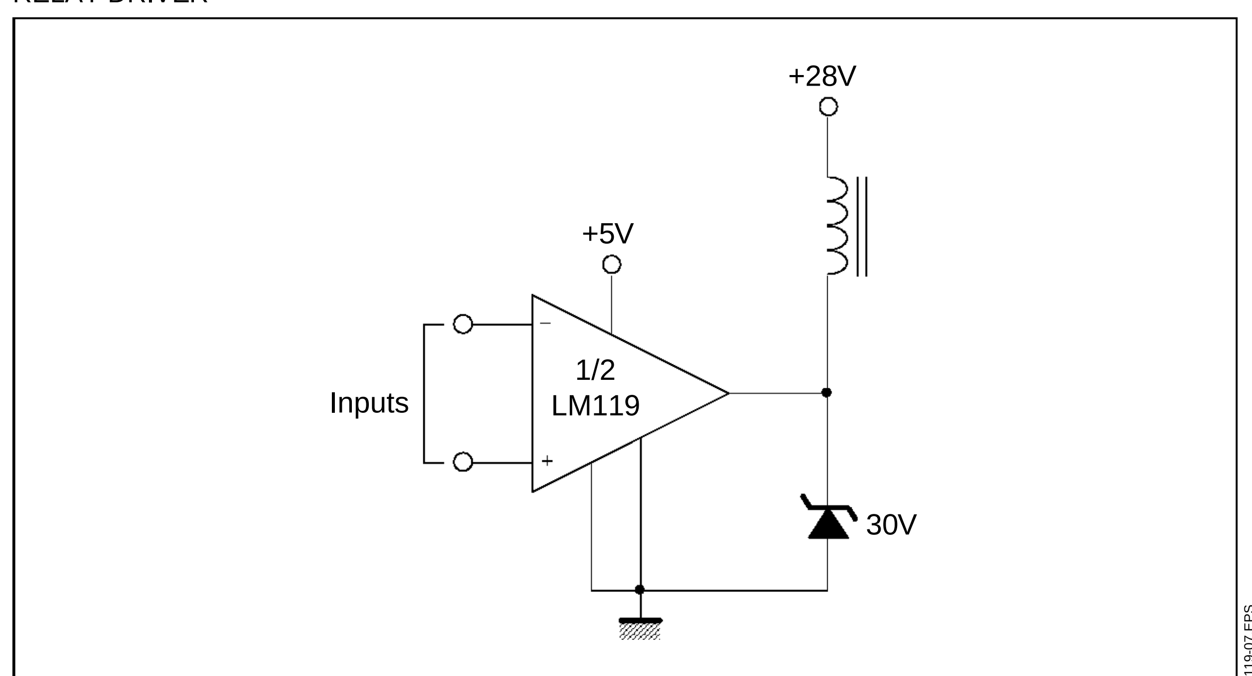

RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



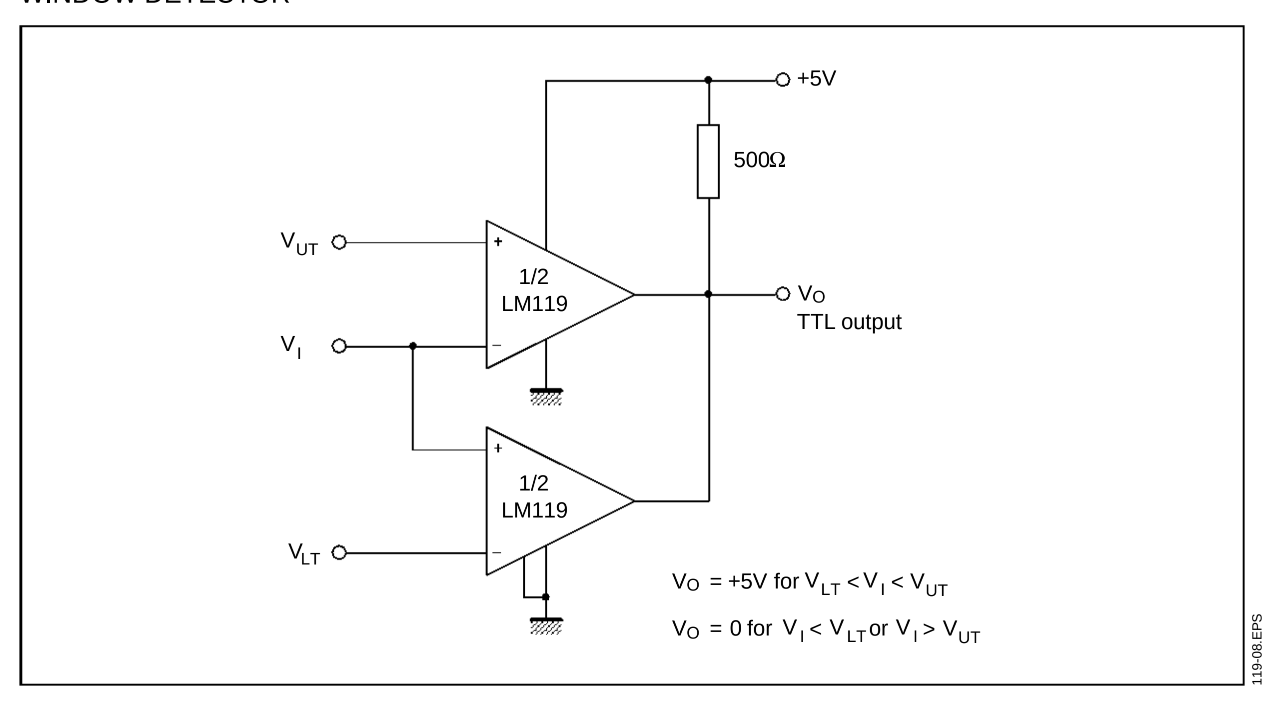

119-06.EPS

## TYPICAL APPLICATION DIAGRAMS

RELAY DRIVER

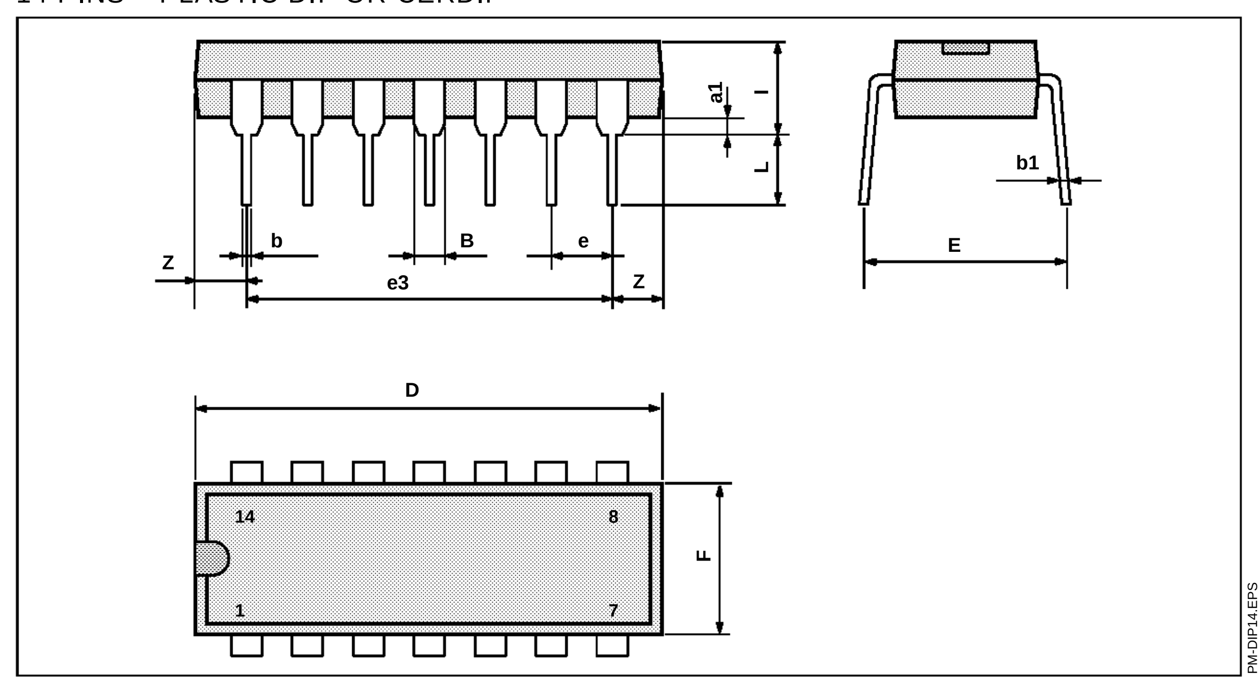



WINDOW DETECTOR



## PACKAGE MECHANICAL DATA

14 PINS – PLASTIC DIP OR CERDIP

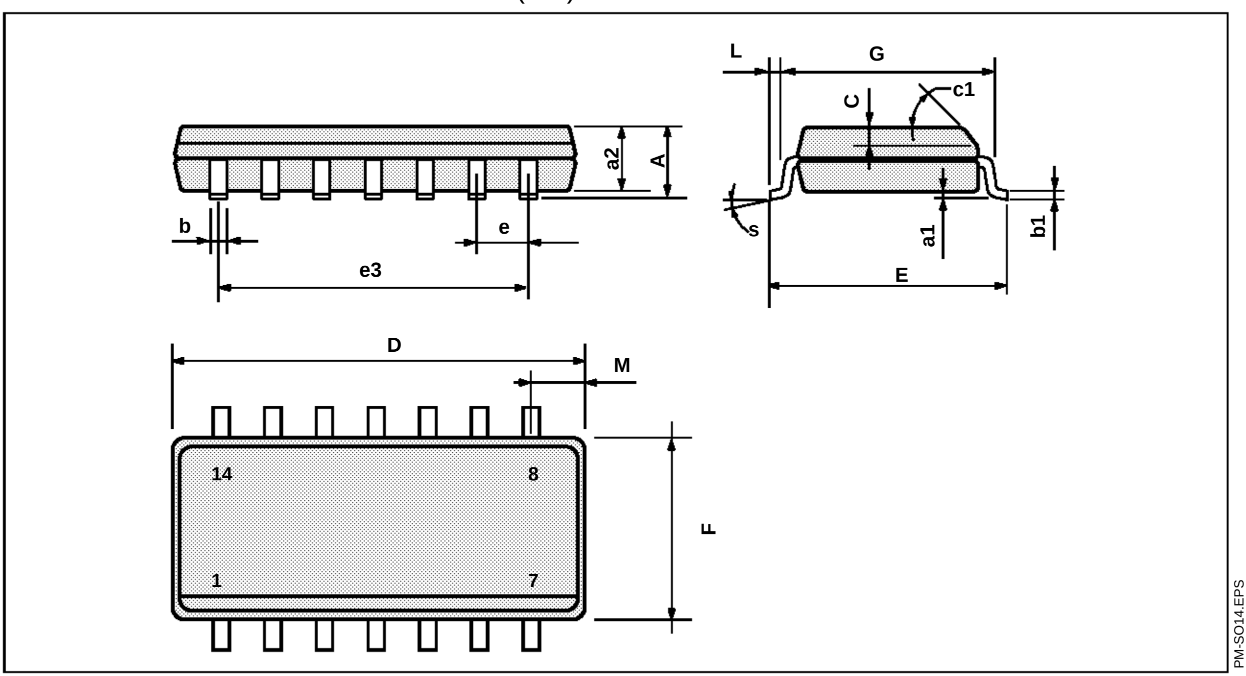



| Dimen-sions | Millimeters | | | Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| a1 | 0.51 | | | 0.020 | | |
| B | 1.39 | | 1.65 | 0.055 | | 0.065 |
| b | | 0.5 | | | 0.020 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 20 | | | 0.787 |
| E | | 8.5 | | | 0.335 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 15.24 | | | 0.600 | |
| F | | | 7.1 | | | 0.280 |
| i | | | 5.1 | | | 0.201 |
| L | | 3.3 | | | 0.130 | |
| Z | 1.27 | | 2.54 | 0.050 | | 0.100 |

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## PACKAGE MECHANICAL DATA

14 PINS – PLASTIC MICROPACKAGE (SO)




| Dimen-sions | Millimeters | | | Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.75 | | | 0.069 |
| a1 | 0.1 | | 0.2 | 0.004 | | 0.008 |
| a2 | | | 1.6 | | | 0.063 |
| b | 0.35 | | 0.46 | 0.014 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | | 0.5 | | | 0.020 | |
| c1 | $45^o$ (typ.) | | | | | |
| D | 8.55 | | 8.75 | 0.336 | | 0.334 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 7.62 | | | 0.300 | |
| F | 3.8 | | 4.0 | 0.150 | | 0.157 |
| G | 4.6 | | 5.3 | 0.181 | | 0.208 |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.68 | | | 0.027 |
| S | $8^o$ (max.) | | | | | |

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ORDER CODE :



